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SOLAR/1045-78/12

Monthly Performance Report

MONTECITO PINES

DECEMBER 1978



U. S. Department of Energy

National Solar Heating and
Cooling Demonstration Program

National Solar Data Program

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MONTHLY PERFORMANCE REPORT

MONTECITO PINES

DECEMBER 1978

I. SYSTEM DESCRIPTION

The Montecito Pines site is an apartment complex in Santa Rosa, California. It consists of one instrumented unit containing eight apartments. Each apartment has approximately 864 square feet of conditioned space. Solar energy is used for space heating and preheating domestic hot water (DHW). The solar energy system which serves the 8-apartment unit has an array of flat-plate collectors with a gross area of 950 square feet. The array faces 22 degrees west of south at an angle of 45 degrees to the horizontal. Water is the transfer medium that delivers solar energy from the collector array to storage and to the space heating and hot water loads. Freeze protection is provided by drain down. Solar energy is stored underground in a 2000-gallon insulated tank. City water is circulated through a heat exchanger in the storage tank for preheating before entering a gas-fired boiler which supplies DHW on demand. When solar energy is insufficient to satisfy the space heating load, the gas-fired boiler provides auxiliary energy for space heating. The system, shown schematically in Figure 1, has four modes of solar operation.

Mode 1 - Collector-to-Storage: This mode activates when the collector plate temperature exceeds the storage temperature by 17°F and terminates when a temperature difference of 3°F is reached. Collector loop pump P1 is operating.

Mode 2 - Storage-to-Space Heating: This mode activates when there is a space heating demand and the temperature at the top of the storage tank is 105°F or higher. Space heating pump P2 is operating and mode diversion valves V1 and V2 divert the flow to the heat exchanger in the storage tank and bypass the gas-fired boiler.

Mode 3 - Auxiliary Space Heating, DHW Preheating: This mode activates when there is a space heating demand and the temperature at the top of the storage tank is less than 105°F. Space heating pump P2 is operating and mode diversion valves V1 and V2 direct the flow through the gas-fired boiler and bypass the heat exchanger in the storage tank.

Mode 4 - DHW Preheating: This mode activates when there is a demand for DHW. Incoming city water passes through the heat exchanger in the storage tank on the way to the gas-fired boiler which supplies hot water, on demand, to the apartments.

II. PERFORMANCE EVALUATION

INTRODUCTION

The solar energy system operated continuously during December. Average daily solar radiation was well above the long-term December average while

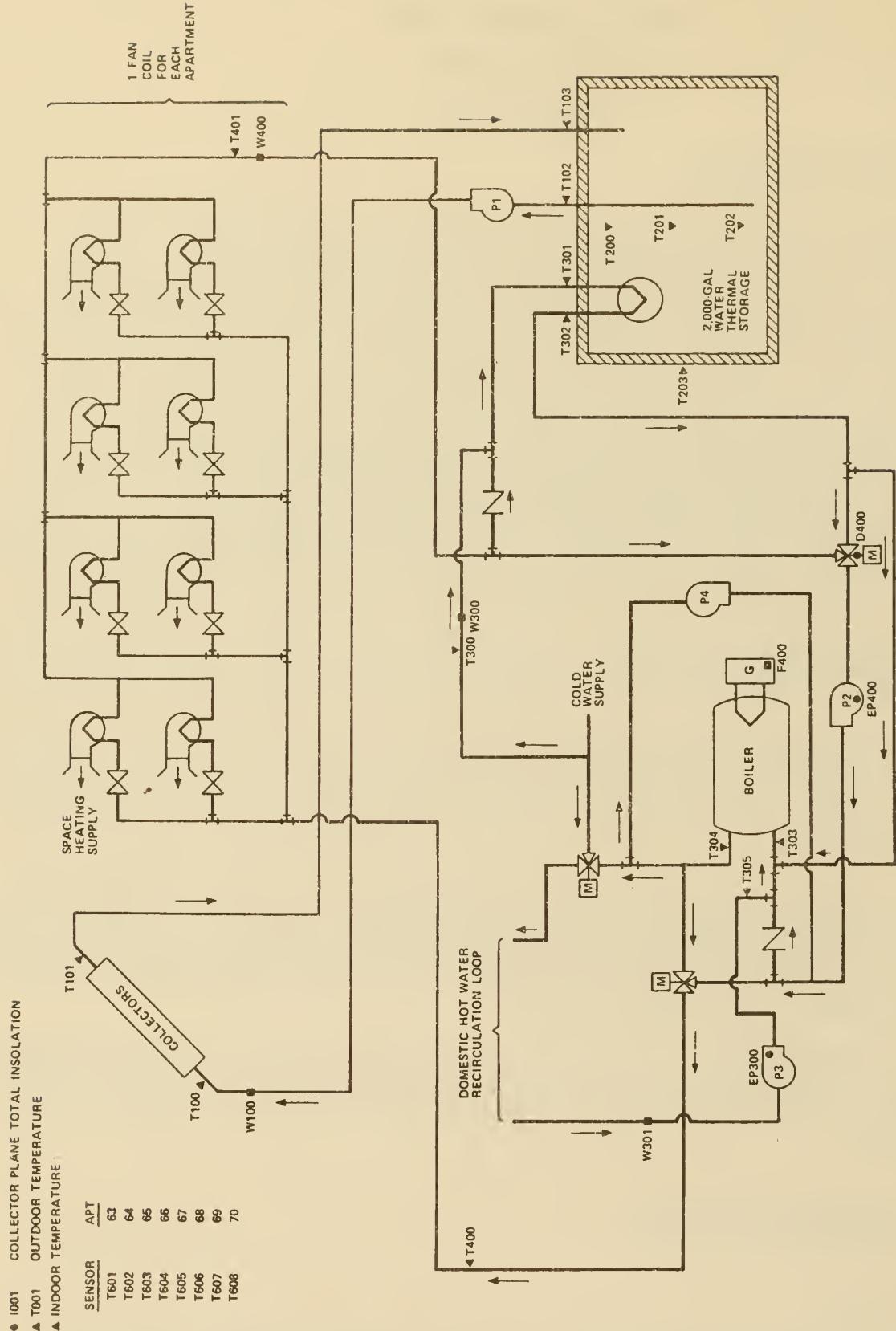


Figure 1. MONTECITO PINES APARTMENTS SOLAR ENERGY SYSTEM SCHEMATIC

average ambient temperature was well below the long-term average for December. Storage average temperature declined gradually during the month of December and the storage average temperature for December was four degrees less than the November monthly average. Approximately equal amounts of solar energy were applied to the DHW and space heating loads in December with the result that solar energy satisfied a significant portion of the DHW load and a small portion of the space heating load.

WEATHER CONDITIONS

During the month, total incident solar energy on the collector array was 34.9 million Btu for a daily average of 1186 Btu per square foot. This was above the estimated average daily solar radiation for this geographical area during December of 928 Btu per square foot for a plane facing 22 degrees west of south with a tilt of 45 degrees to the horizontal. The average ambient temperature during December was 41°F as compared with the long-term average for December of 48°F.

THERMAL PERFORMANCE

Collector - The total incident solar radiation on the collector array for the month of December was 34.9 million Btu. During the period the collector loop was operating, the total insolation amounted to 31.4 million Btu. The total collected solar energy for the month of December was 9.8 million Btu, resulting in a collector array efficiency of 28 percent, based on total incident insolation. Solar energy delivered from the collector array to storage was 8.4 million Btu. Energy loss during transfer from the collector array to storage was 1.4 million Btu. This loss represented 14 percent of the energy collected. Operating energy required by the collector loop was 0.56 million Btu.

Storage - Solar energy delivered to storage was 8.4 million Btu. There were 6.5 million Btu delivered from storage to the DHW and space heating subsystems. Energy loss from storage was 1.7 million Btu. This loss represented 20 percent of the energy delivered to storage. The storage efficiency was 80 percent: This is calculated as the ratio of the sum of the energy removed from storage and the change in stored energy, to the energy delivered to storage. The average storage temperature for the month was 102°F.

DHW Load - The DHW subsystem consumed 2.6 million Btu of solar energy and 4.3 million Btu of auxiliary thermal energy (equivalent to 5.4 million Btu auxiliary fossil fuel energy) to satisfy a hot water load of 6.0 million Btu. The solar fraction of this load was 43 percent. The DHW subsystem consumed a total of 0.70 million Btu of operating energy, none of which was chargeable to the solar energy system. A daily average of 322 gallons of DHW was consumed at an average temperature of 134°F delivered from the tank.

Space Heating Load - The space heating subsystem consumed 2.5 million Btu of solar energy and 37.6 million Btu of auxiliary thermal energy (equivalent to 47.0 million Btu auxiliary fossil fuel energy) to satisfy a space heating

load of 30.0 million Btu. The solar fraction of this load was 8 percent. Losses from the space heating subsystem were 10.1 million Btu. The space heating subsystem consumed a total of 2.2 million Btu of operating energy, none of which was chargeable to the solar energy system.

OBSERVATIONS

Extreme stability has masked the performance of the solar energy system over the past two months. Operational incident solar energy has averaged 90 percent of total incident solar energy; solar conversion efficiency has averaged 14 percent and collector efficiency has averaged 28 percent. Month-to-month variation for these parameters is less than 1 percent. Losses between the collector array and storage declined from 17 percent in November to 14 percent in December. This rate of loss is on the high side but is not unreasonable.

Approximately 5.0 million Btu of solar energy were applied to the DHW and space heating loads in both November and December. The allocation between loads was significantly different however: In November, two-thirds of the solar energy was applied to the space heating load and one-third to the DHW load; in December, approximately equal amounts of solar energy were applied to the DHW and space heating loads. The governing factor in the division of solar energy between the DHW and space heating loads in this system is the storage tank temperature. Assuming a demand for both DHW and space heating, increasing amounts of available solar energy will be applied to the DHW load as the storage tank temperature declines.

ENERGY SAVINGS

The solar energy system provided a total fossil fuel energy savings of 8.5 million Btu at an expense of 0.56 million Btu of electrical energy. The DHW subsystem provided a fossil fuel energy savings of 4.4 million Btu. The space heating subsystem contributed a fossil fuel energy savings of 4.2 million Btu.

III. ACTION STATUS

Sensor problems exist in the DHW recirculation loop and with the gas usage totalizer. A site visit by IBM and Boeing has been scheduled for January.

SOLAR HEATING AND COOLING DEMONSTRATION PROGRAM

MONTHLY REPORT
SITE SUMMARYSITE: MONTECITO PINES
REPORT PERIOD: DECEMBER, 1978

SANTA ROSA, CA

SOLAR / 1045-78/17

SITE/SYSTEM DESCRIPTION: MONTECITO PINES IS AN APARTMENT COMPLEX WITH EIGHT INSTRUMENTED UNITS. THE SOLAR ENERGY SYSTEM PROVIDES SPACE HEATING AND DOMESTIC HOT WATER. THE COLLECTOR STORAGE LOOP USES WATER FOR THE ENERGY TRANSFER AND STORAGE MEDIUM. WATER FOR DOMESTIC HOT WATER USE PASSES THROUGH A EX IN THE STORAGE TANK AND THEN THROUGH A GAS FIRED RAILER IN THE DHW PECIRC. LOOP. WATER FOR SPACE HEATING CIRCULATES THROUGH THE STORAGE TANK HX OR THROUGH THE GAS FIRED RAILER AND IS AVAILABLE TO INDIVIDUAL APARTMENTS ON DEMAND.

GENERAL SITE DATA:
INCIDENT SOLAR ENERGY

COLLECTED SOLAR ENERGY

AVERAGE AMBIENT TEMPERATURE	50
AVERAGE BUILDING TEMPERATURE	70
FCCS SOLAR CONVERSION EFFICIENCY	0.15
FCCS OPERATING ENERGY	0.00
TOTAL SYSTEM OPERATING ENERGY	0.00
TOTAL ENERGY CONSUMED	0.00

SUBSYSTEM SUMMARY:

	HOT WATER	HEATING	COOLING
LOAD	6.077	30.015	N.A.
SOLAR FRACTION	4.3	8	N.A.
SOLAR ENERGY USED	2.592	2.497	N.A.
OPERATING ENERGY	0.704	2.106	N.A.
AUX. THERMAL ENERGY	4.324	37.603	2.455
AUX. ELECTRIC ENERGY	N.A.	N.A.	41.966
AUX. FOSSIL FUEL	5.405	47.004	52.458
FUELCYCLICAL SAVINGS	0.000	0.000	-2.555
FOSSIL SAVINGS	4.303	4.162	0.64

SYSTEM PERFORMANCE FACTOR:

* DENOTES UNAVAILABLE DATA
@ DENOTES NULL DATA
N.A. DENOTES NOT APPLICABLE DATA

REFERENCE: USER'S GUIDE TO THE MONTHLY PERFORMANCE REPORT OF THE NATIONAL SOLAR DATA PROGRAM, FEBRUARY 28, 1978.
SOLAP/0004-78/1a

	SYSTEM	TOTAL
34.933	MILLION BTU	MILLION BTU
36.771	BTU/SQ.FT.	BTU/SQ.FT.
0.782	MILLION BTU	MILLION BTU
1.298	BTU/SQ.FT.	BTU/SQ.FT.
4.1	DEGREES F	DEGREES F
6.4	DEGREES F	DEGREES F
0.15	MILLION BTU	MILLION BTU
0.555	MILLION BTU	MILLION BTU
3.455	MILLION BTU	MILLION BTU
65.606	MILLION BTU	MILLION BTU

SOLAR HEATING AND COOLING DEMONSTRATION PROGRAM

MONTHLY REPORT
SITE SUMMARY

SITE: MONTFORTO DINFO
REPORT PERIOD: NOVEMBER, 1978

SANTA ROSA, CA

SOLAR / 1045-78/12

SITE/SYSTEM DESCRIPTION.

MONTFORTO DINFO IS AN APARTMENT COMPLEX WITH EIGHT INDEPENDENT UNITS. THE SOLAR ENERGY SYSTEM PROVIDES SPACE HEATING AND DOMESTIC HOT WATER. THE COLLECTION STORAGE LOOP USES WATER FOR THE ENERGY TRANSFER AND STORAGE CLOUTUM. WATER FOR DOMESTIC HOT WATER USE PASSSES THROUGH A HX IN THE STORAGE TANK AND THEN THROUGH A GAS FIRED BOILER IN THE DHW RECIRC. LOOP. WATER FOR SPACE HEATING CIRCULATES THROUGH THE STORAGE TANK HX UP THROUGH THE GAS FIRED BOILER AND IS AVAILABLE TO INDIVIDUAL APARTMENTS ON DEMAND.

GENERAL SITE DATA:
INCIDENT SOLAR ENERGY

COLLECTED SOLAR ENERGY

AVERAGE AMBIENT TEMPERATURE
AVERAGE BUILDING TEMPERATURE
FCCSS SOLAR CONVERSION EFFICIENCY
FCCSS OPERATING ENERGY
TOTAL SYSTEM OPERATING ENERGY
TOTAL ENERGY CONSUMED

SUBSYSTEM SUMMARY:

	HOT WATER	HEATING	Cooling	System Total
LOAD	6.306	31.666	N.A.	37.958 GIGA JOURNALS
SOLAR FRACTION	42	8	N.A.	14 PERCENT
SOLAR ENERGY USED	2.724	2.634	N.A.	5.358 GIGA JOURNALS
OPERATING ENERGY	0.742	2.317	N.A.	3.645 GIGA JOURNALS
AUX. THERMAL ENG	4.562	2.672	N.A.	4.4274 GIGA JOURNALS
AUX. ELECTRIC FUEL	N.A.	N.A.	N.A.	5.5342 GIGA JOURNALS
AUX. FOSSIL FUEL	5.703	4.999	N.A.	-0.585 GIGA JOURNALS
ELECTRICAL SAVINGS	0.000	0.000	N.A.	0.032 GIGA JOURNALS
FOSSIL SAVINGS	4.520	4.390	N.A.	

SYSTEM PERFORMANCE FACTOR:

* DENOTES UNAVAILABLE DATA

@ DENOTES NULL DATA
N.A. DENOTES NOT APPLICABLE DATA

REFERENCE: USER'S GUIDE TO THE MONTHLY PERFORMANCE REPORT
OF THE NATIONAL SOLAR DATA PROGRAM, FEBRUARY 28, 1978,
SOLAR/DOE-78/18

SOLAR HEATING AND COOKING DEMONSTRATION PROGRAM

ENERGY COLLECTION AND STORAGE SYSTEM REPORT

SITE: MONTECITO PINES
REPORT PERIOD: DECEMBER, 1978

SANTA BARBARA, CA

SCLAB/1245-78/12

DAY OF MONTH	INCIDENT SOLAR ENERGY MILLION BTU	AMBIENT TEMP DEG-F	ENERGY TO LOADS MILLION BTU	AUX THERMAL TO FSS MILLION BTU	FSS OPERATING ENERGY MILLION BTU	FSS ENERGY DEFECTED MILLION BTU	FSS CONVENTIONAL ENERGY DEFICIENCY	FSS SOLAR ENERGY DEFICIENCY
1	1.556	51	0.310	N/A	0.022	0.000	0.122	-
2	1.564	45	0.364	N/A	0.022	0.000	0.165	-
3	1.567	44	0.323	N/A	0.023	0.000	0.116	-
4	1.820	46	0.280	N/A	0.024	0.000	0.094	-
5	*	*	*	*	*	*	*	*
6	1.640	41	0.317	4.0	0.023	0.000	0.158	-
7	1.575	41	0.272	4.0	0.023	0.000	0.140	-
8	1.304	36	0.250	4.0	0.023	0.000	0.137	-
9	1.070	40	0.134	4.0	0.021	0.000	0.124	-
10	1.295	44	0.253	4.0	0.021	0.000	0.124	-
11	0.868	47	0.123	4.0	0.021	0.000	0.124	-
12	*	*	*	*	*	*	*	*
13	1.305	45	0.208	4.0	0.021	0.000	0.128	-
14	1.470	45	0.204	4.0	0.021	0.000	0.130	-
15	1.250	42	0.204	4.0	0.021	0.000	0.140	-
16	1.474	42	0.204	4.0	0.021	0.000	0.128	-
17	1.000	44	0.104	4.0	0.021	0.000	0.125	-
18	0.900	44	0.093	4.0	0.021	0.000	0.125	-
19	1.672	49	0.246	4.0	0.021	0.000	0.125	-
20	1.001	46.8	0.252	4.0	0.021	0.000	0.125	-
21	1.111	36.0	0.248	4.0	0.022	0.000	0.125	-
22	1.001	30.1	0.380	4.0	0.023	0.000	0.174	-
23	1.001	43.3	0.360	4.0	0.023	0.000	0.164	-
24	1.000	36.0	0.310	4.0	0.023	0.000	0.321	-
25	1.000	25.9	0.370	4.0	0.023	0.000	0.217	-
26	1.000	49.1	0.670	4.0	0.023	0.000	0.444	-
27	1.000	30.0	0.670	4.0	0.023	0.000	0.078	-
28	1.000	0.75	0.630	4.0	0.023	0.000	0.155	-
29	1.000	88.6	0.660	4.0	0.023	0.000	0.044	-
30	1.000	55.1	0.695	4.0	0.023	0.000	0.142	-
31	1.000	50.7	0.142	4.0	0.023	0.000	0.142	-
		1.434	0.284	4.0	0.023	0.000	0.000	-
SUM	34.033	-	6.471	N/A	0.555	N/A	N/A	-
Avg	1.127	41	0.200	N/A	0.018	N/A	0.145	-
NBS IN	Q001	N113	012	N/A	0.012	N/A	N/A	N/A

DENOTES UNAVAILABLE DATA.

@ DENOTES NULL DATA.

N.A. DENOTES NOT APPLICABLE DATA.

SOLAR HEATING AND COOLING DEMONSTRATION PROGRAM

MONTHLY REPORT
COLLECTED AREA PERFORMANCESITE: MONTECITO PINES
PERIOD PERIOD: DECEMBER, 1978
SANTA ROSA, CA SOLAR / 1745-78/12

DAY OF MONTH	INCIDENT SOLAR ENERGY MILLION RTU	OPERATIONAL INCIDENT ENERGY MILLION RTU	COLLECTED SOLAR ENERGY MILLION RTU		DAVTIME AMOUNT DEG F	COLLECTED ARRAY EFFICIENCY
			COLLECTED SOLAR ENERGY MILLION RTU	DAVTIME AMOUNT DEG F		
1	1.556	1.447	0.475	50	205	0.315
2	1.564	1.458	0.486	50	311	0.291
3	1.567	1.467	0.459	60	292	0.298
4	1.830*	1.714*	0.546*	50	291	*
5	1.640	1.502	0.420	48	256	0.256
6	1.575	1.473	0.403	47	256	0.254
7	1.304	1.280	0.355	49	284	0.294
8	0.070	0.087	0.0278	51	262	*
9	0.295	0.103	0.0288	57	262	*
10	0.868	0.708*	0.228*	57	262	*
11	0.295*	0.103*	0.0288*	57	262	*
12	1.305	1.244	0.421	57	272	0.272
13	1.470	1.375	0.455	57	272	0.272
14	1.258	1.154	0.462	54	292	0.292
15	1.274	1.195	0.420	50	252	0.252
16	0.990	0.000	0.000	45	214	0.214
17	0.672	0.527	0.140	46	260	0.260
18	0.468	0.384	0.136	41	272	0.272
19	0.360	0.218	0.086	52	295	0.295
20	0.391	0.307	0.120	41	241	0.241
21	0.433	0.357	0.120	40	214	0.214
22	0.468	0.384	0.120	40	260	0.260
23	0.360	0.218	0.086	40	272	0.272
24	0.258	0.181	0.064	40	295	0.295
25	0.000	0.000	0.000	40	241	0.241
26	0.075	0.000	0.000	41	277	0.277
27	0.000	0.000	0.000	41	277	0.277
28	0.086	0.075	0.023	41	277	0.277
29	0.551	0.426	0.123	42	347	0.347
30	1.507	1.431	0.447	42	347	0.347
31	1.434	1.229	0.419	52	201	0.201
SUM	24.023	21.426	6.782	-	-	-
Avg	1.127	1.014	0.216	50	280	0.280
NPSID	0001		0100		N100	

* DENOTES UNAVAILABLE DATA.
 @ DENOTES NULL DATA.
 N.A. DENOTES NOT APPLICABLE DATA.

SOLAR HEATING AND COOLING DEMONSTRATION PROGRAM

MONTHLY REPORT
STOPPAGE PERFORMANCESITE: MONTECITO PINES
REPORT PERIOD: DECMBER, 1978

SANTA ROSA, CA SPLAR/1045-78/12

DAY OF MONTH	ENERGY TO STORAGE MILLION BTU	ENERGY FROM STORAGE MILLION BTU	CHANGE IN STORED ENERGY MILLION BTU	STORAGE AVERAGE TEMP DEG F	STORAGE EFFICIENCY
					NR S IN
1	0.416	0.310	0.016	107	0.900
2	0.432	0.364	-0.066	107	0.842
3	0.403	0.322	-0.081	108	0.804
4	0.473	0.280	-0.193	109	0.881
5	*	*	*	*	*
6	0.369	0.310	-0.059	105	0.807
7	0.342	0.272	-0.070	104	0.820
8	0.285	0.250	-0.035	103	0.848
9	0.215	0.124	-0.091	103	0.802
10	0.215	0.253	-0.038	105	0.732
11	0.158	0.123	-0.035	102	0.674
12	0.367	0.209	-0.158	103	*
13	0.399	0.298	-0.101	108	0.784
14	0.305	0.204	-0.101	106	0.813
15	0.375	0.204	-0.171	106	0.811
16	0.070	0.104	-0.034	108	0.797
17	0.132	0.093	-0.039	102	0.828
18	0.132	0.246	-0.114	102	0.765
19	0.394	0.252	-0.142	104	0.820
20	0.321	0.248	-0.073	106	0.779
21	0.330	0.310	-0.080	106	0.811
22	0.369	0.170	-0.199	106	0.850
23	0.205	0.071	-0.134	104	0.764
24	0.071	0.071	-0.000	99	-0.602
25	0.016	0.067	-0.051	90	0.220
26	0.000	0.063	-0.063	87	0.000
27	0.000	0.060	-0.060	80	0.812
28	0.236	0.095	-0.141	92	0.720
29	0.106	0.142	-0.036	98	0.744
30	0.393	0.284	-0.109	104	0.727
31	0.377	0.012	-0.365	-	-
SUM	8.361	6.471	0.104	-	-
Avg	0.270	0.200	0.006	102	0.707
NRS IN	9200	9201	9202	9199	9198

* DENOTES UNAVAILABLE DATA.

@ DENOTES NULL DATA.

N.A. DENOTES NOT APPLICABLE DATA.

SOLAR HEATING AND COOLING DEMONSTRATION PROGRAM

MONTHLY REPORT
HOT WATER SYSTEM

SITE: MUNIFICENT DINING
REPORT DATED: DECEMBER, 1978

SANTA ROSA, CA

IDENTES INAVIARI E DATA:

CENTENARY CELEBRATION OF THE UNIVERSITY OF TORONTO

NOTE: A DENOTES NOT APPLICABLE DATA.

SOLAR HEATING AND COOLING DEMONSTRATION PROGRAM

MONTHLY REPORT
SOLAR HEATING SYSTEMSITE: MONTECITO PINES
REPORT PERIOD: DECEMBER, 1978

SANTA ROSA, CA

SOLAR / 1045-78/12

DAY OF MON.	SPACE HEATING LOAD MILLION BTU	SOLAR FR. OFF LOAD PCT	SOLAR ENERGY USED MILLION BTU	AUX THERMAL USE MILLION BTU	AUX EFFECT MILLION BTU	AUX EFFECT MILLION BTU	AUX EFFECT MILLION BTU	FOSSIL ENERGY SAVINGS MILLION BTU	FOSSIL ENERGY SAVINGS MILLION BTU	FOSSIL ENERGY SAVINGS MILLION BTU	FOSSIL ENERGY SAVINGS MILLION BTU
1	0.627	21	0.172	0.071	0.071	0.071	0.071	0.000	0.000	0.000	0.000
2	0.809	26	0.166	0.071	0.071	0.071	0.071	0.000	0.000	0.000	0.000
3	0.781	20	0.116	0.071*	0.071*	0.071*	0.071*	0.000	0.000	0.000	0.000
4	0.573	14	1.371	0.209	0.071	1.400	0.071	0.000	0.000	0.000	0.000
5	*	*	1.391	0.2148	0.071	1.526	0.071	0.000	0.000	0.000	0.000
6	6.677	8	1.134	0.071	1.17	0.106	0.071	0.000	0.000	0.000	0.000
7	0.922	10	0.812	1.422	0.071	0.127	0.071	0.000	0.000	0.000	0.000
8	0.813	11	0.813	1.427	0.071	0.127	0.071	0.000	0.000	0.000	0.000
9	0.813	12	0.813	1.427	0.071	0.127	0.071	0.000	0.000	0.000	0.000
10	0.813	13	0.813	1.427	0.071	0.127	0.071	0.000	0.000	0.000	0.000
11	1.172	14	0.813	1.427	0.071	0.127	0.071	0.000	0.000	0.000	0.000
12	0.726	15	0.579	2.27	0.071	0.177	0.071	0.000	0.000	0.000	0.000
13	0.579	16	0.756	1.4	0.071	0.177	0.071	0.000	0.000	0.000	0.000
14	0.690	17	0.827	0.914	0.071	0.177	0.071	0.000	0.000	0.000	0.000
15	0.690	18	0.690	0.914	0.071	0.177	0.071	0.000	0.000	0.000	0.000
16	0.690	19	0.690	0.914	0.071	0.177	0.071	0.000	0.000	0.000	0.000
17	0.690	20	0.690	0.914	0.071	0.177	0.071	0.000	0.000	0.000	0.000
18	0.690	21	0.690	0.914	0.071	0.177	0.071	0.000	0.000	0.000	0.000
19	0.690	22	0.690	0.914	0.071	0.177	0.071	0.000	0.000	0.000	0.000
20	0.690	23	0.690	0.914	0.071	0.177	0.071	0.000	0.000	0.000	0.000
21	0.690	24	0.690	0.914	0.071	0.177	0.071	0.000	0.000	0.000	0.000
22	0.690	25	0.690	0.914	0.071	0.177	0.071	0.000	0.000	0.000	0.000
23	0.690	26	0.690	0.914	0.071	0.177	0.071	0.000	0.000	0.000	0.000
24	0.690	27	0.690	0.914	0.071	0.177	0.071	0.000	0.000	0.000	0.000
25	0.690	28	0.690	0.914	0.071	0.177	0.071	0.000	0.000	0.000	0.000
26	0.690	29	0.690	0.914	0.071	0.177	0.071	0.000	0.000	0.000	0.000
27	0.690	30	0.690	0.914	0.071	0.177	0.071	0.000	0.000	0.000	0.000
28	0.690	31	0.690	0.914	0.071	0.177	0.071	0.000	0.000	0.000	0.000
29	0.690	30	1.065	1.31	0.071	0.177	0.071	0.000	0.000	0.000	0.000
30	1.065	31	1.065	1.31	0.071	0.177	0.071	0.000	0.000	0.000	0.000
31	1.065	32	1.065	1.31	0.071	0.177	0.071	0.000	0.000	0.000	0.000
SUM	30.215	-	7.467	2.196	37.627	N.A.	4.7	0.004	7.000	4.62	-
Avg	0.968	8	0.081	0.071	1.0213	N.A.	1.516	0.000	0.000	0.64	4.1
N.R.	0.402	N400	0.400	0.403	0.415	N417	N406	N112	N406	N112	-

* DENOTES UNAVAILABLE DATA.

^ DENOTES NULL DATA.

N.A. DENOTES NOT APPLICABLE DATA.

SOLAR HEATING AND COOLING DEMONSTRATION PROGRAM

MONTHLY REPORT
ENVIRONMENTAL SUMMARY

SITE: MONTECITO DINES
PERIOD: DECEMBER, 1978

SOLAR/1045-79/12

SANTA ROSA, CA

DAY OF MONTH	TOTAL INSULATION RTU/SQ.FT	DIFFUSE INSULATION RTU/SQ.FT	AMBIENT TEMPERATURE DEG F	RELATIVE HUMIDITY DEPENT	WIND INFECTION DEGREES	WIND SPEED M.O.H.
1	1638	N	51	58	N	N
2	1646	C	45	56	C	C
3	1650	T	44	50	A	A
4	1927*	A	46*	59*	P	P
5	67	P	41	48	P	P
6	1727	L	41	47	L	L
7	1658	TIC	26	40	TIC	C
8	1467	C	40	55	A	A
9	1031	A	44	57	R	R
10	1362	R	47	45	L	L
11	912	LUE	*	60	C	C
12	1374	A	45	61	A	A
13	1548	R	45	57	R	R
14	1325	L	42	54	L	L
15	1551	T	42	45	C	C
16	174	44	44	44	A	A
17	707	47	47	47	A	A
18	1545	49	37	49	L	L
19	1431	49	36	49	C	C
20	1465	52	38	52	A	A
21	1508	53	30	53	R	R
22	1032	36	36	41	L	L
23	1272	37	37	40	C	C
24	507	37	36	40	A	A
25	326	36	36	41	R	R
26	79	30	40	47	L	L
27	922	36	36	41	C	C
28	580	37	37	42	A	A
29	1597	37	37	52	R	R
30	1510					
31						
SUM	36771	N.A.	-	-	-	-
AVG	1186	N.A.	41	50	N.A.	N.A.
NBS ID	0001	N112		N115	M114	

* DENOTES UNAVAILABLE DATA.

† DENOTES NULL DATA.

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